

CLAIMS

What is claimed is:

- 1 1. A method of optimizing production from a formation without creating
2 undue risk of mechanical instability of the formation, comprising:
3
4 sensing a bottom hole flowing pressure;
5
6 comparing the bottom hole flowing pressure to a stability envelope for the
7 formation; and
8
9 adjusting fluid production to maintain the bottom hole flowing pressure
10 within a desired region of the stability envelope.
- 1 2. The method as recited in claim 1, further comprising adjusting a sensor sampling
2 rate as a function of the position of the bottom hole flowing pressure in the
3 stability envelope.
- 1 3. The method as recited in claim 1, wherein sensing comprises sensing the bottom
2 hole flowing pressure repeatedly and periodically.
- 1 4. The method as recited in claim 1, wherein comparing comprises utilizing a
2 computerized device to automatically compare the bottom hole flowing pressure
3 to the stability envelope.
- 1 5. The method as recited in claim 1, wherein adjusting comprises adjusting a valve
2 to change the fluid production rate.

- 1 6. The method as recited in claim 1, wherein adjusting comprises adjusting a choke
2 to change the fluid production rate.
- 1 7. The system as recited in claim 1, wherein adjusting comprises adjusting an
2 artificial lift mechanism to change the fluid production rate.
- 1 8. A method of optimizing production from a formation, comprising:
2
3 comparing a bottom hole flowing pressure to a reservoir pressure in real-
4 time to determine an underbalance as a fluid is produced from the formation; and
5
6 continuously adjusting the bottom hole flowing pressure to maintain the
7 level of underbalance in proximity to a predetermined maximum underbalance for
8 a measured reservoir pressure.
- 1 9. The method as recited in claim 8, wherein comparing comprises continuously
2 sensing the bottom hole flowing pressure and the measured reservoir pressure.
- 1 10. The method as recited in claim 9, wherein continuously sensing comprises
2 periodically sensing the bottom hole flowing pressure.
- 1 11. The method as recited in claim 9, wherein continuously sensing comprises using a
2 downhole pressure sensor to determine the bottom hole flowing pressure.
- 1 12. The method as recited in claim 8, wherein continuously adjusting comprises
2 automatically adjusting the production flow rate of the fluid.
- 1 13. The method as recited in claim 12, wherein adjusting the production flow rate
2 comprises adjusting a valve.

- 1 14. The method as recited in claim 12, wherein adjusting the production flow rate
2 comprises adjusting a choke.
- 1 15. The method as recited in claim 12, wherein adjusting the production flow rate
2 comprises adjusting an artificial lift mechanism.
- 1 16. A system for optimizing production from a formation, comprising:
2
3 a completion deployed in a wellbore, the completion having a flow control
4 mechanism able to control the rate at which a fluid is produced through the
5 wellbore;
6
7 a reservoir pressure sensor;
8
9 a bottom hole flowing pressure sensor; and
10
11 a stability envelope for the formation, wherein the flow control
12 mechanism is adjustable to maintain the ratio of bottom hole flowing pressure to
13 reservoir pressure within a specific region of the stability envelope.
- 1 17. The system as recited in claim 16, wherein the flow control mechanism comprises
2 an artificial lift mechanism.
- 1 18. The system as recited in claim 16, further comprising a computerized controller to
2 receive signals from the reservoir pressure sensor and the bottom hole flowing
3 pressure sensor and to automatically adjust the flow control mechanism based on
4 the signals received.
- 1 19. The system as recited in claim 16, wherein the flow control mechanism comprises
2 a valve.

- 1 20. The system as recited in claim 17, wherein the flow control mechanism comprises
2 a choke.
- 1 21. The system as recited in claim 16, further comprising a control system to compare
2 the reservoir pressure and the bottom hole flowing pressure to the stability
3 envelope and to automatically adjust the bottom hole flowing pressure.
- 1 22. A method of optimizing production of a fluid from a formation without
2 incurring sanding due to mechanical instability of the formation, comprising:
3
4 monitoring in real-time a reservoir pressure of the formation and a bottom
5 hole flowing pressure proximate a production completion; and
6
7 periodically adjusting the ratio of bottom hole flowing pressure to
8 reservoir pressure to maintain the ratio at a desired position relative to a
9 predetermined line representative of the maximum pressure ratio underbalance for
10 the formation.
- 1 23. The method as recited in claim 22, wherein monitoring comprises utilizing a
2 downhole pressure sensor.
- 1 24. The method as recited in claim 22, further comprising deploying a completion in a
2 wellbore to control production of the fluid.
- 1 25. The method as recited in claim 24, wherein deploying comprises suspending the
2 completion on a tubing through which the fluid is produced.
- 1 26. The method as recited in claim 22, wherein deploying comprises deploying a
2 completion having a flow control mechanism adjustable to control a production
3 rate and the bottom hole flowing pressure.

- 1 27. The method as recited in claim 22, wherein periodically adjusting comprises
2 automatically adjusting the bottom hole flowing pressure.
- 1 28. The method as recited in claim 22, further comprising adjusting a sensor sampling
2 rate as a function of the ratio of bottom hole flowing pressure to reservoir
3 pressure.
- 1 29. A system for optimizing production of a fluid from a formation without
2 incurring sanding due to mechanical instability of the formation, comprising:
3
4 means for monitoring a reservoir pressure of the formation and a bottom
5 hole flowing pressure proximate a production completion; and
6
7 means for periodically adjusting the ratio of bottom hole flowing pressure
8 to reservoir pressure to maintain the ratio at a desired position relative to a
9 predetermined line representative of the maximum pressure ratio underbalance for
10 the formation.
- 1 30. The system as recited in claim 29, wherein the means for monitoring comprises a
2 pressure sensor.
- 1 31. The system as recited in claim 29, wherein the means for periodically adjusting
2 comprises a flow control mechanism by which bottom hole flowing pressure is
3 changed.